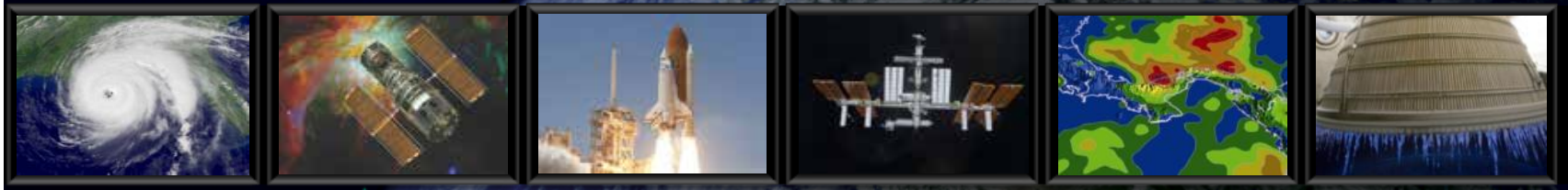
Agenda

♦ 12:30 pm	Call to Order/Welcome/Agenda Overview	Steve Doering
♦ 12:45 pm	NASA SLS Program Overview	Jody Singer
♦ 1:15 pm	NASA SLS Procurement Strategy	Earl Pendley
♦ 1:30 pm	SLS Stages Elements	John Honeycutt
♦ 1:45 pm	MAF Update	Robert Champion
♦ 2:00 pm	MAF Contracting Process	Jim Taylor
♦ 2:15 pm	Questions/Wrap Up with All Presenters	

National Aeronautics and Space Administration

Space Launch System (SLS) Program Overview

Michoud Assembly Facility (MAF) Industry Day



Space Launch System

Jody Singer, Deputy Program Manager
NASA Space Launch System Program
NASA Marshall Space Flight Center
November 2011

www.nasa.gov

The NASA Vision

To reach for new heights and reveal the unknown, so that what we do and learn will benefit all humankind.

NASA Strategic Goals

- ✔ *Extend and sustain human activities across the solar system.*
- ✓ Expand scientific understanding of the Earth and the universe in which we live.
- ✓ Create the innovative new space technologies for our exploration, science, and economic future.

  Advance aeronautics research for societal benefit.
- ✓ Enable program and institutional capabilities to conduct NASA's aeronautics and space activities.
- ✓ Share NASA with the public, educators, and students to provide opportunities to participate in our mission, foster innovation, and contribute to a strong national economy.

SLS Clearly Contributes to NASA's Strategic Goals

SLS and the NASA Authorization Act of 2010

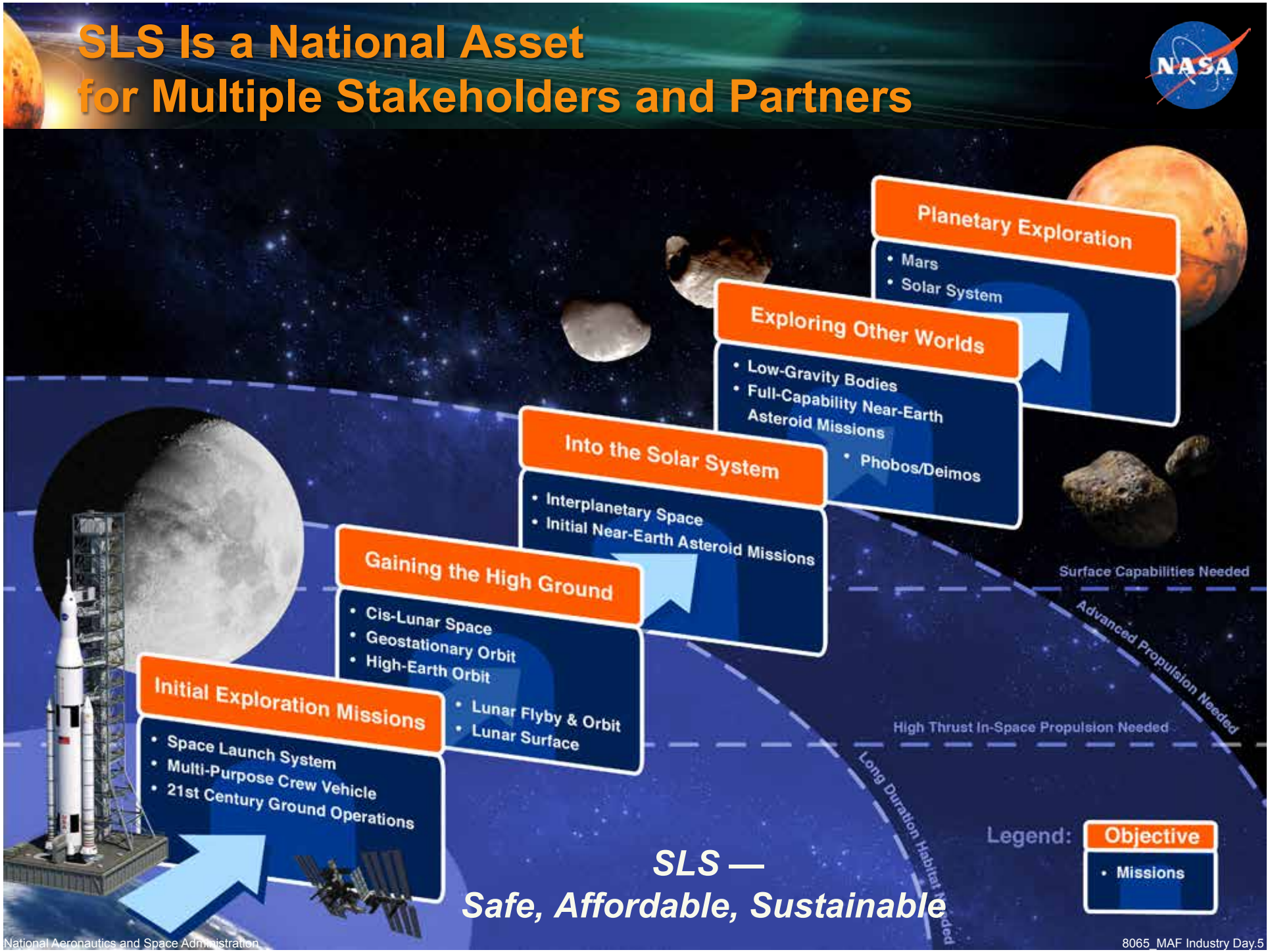
- **The Congress approved and the President signed the National Aeronautics and Space Administration Authorization Act of 2010**
  - Bipartisan support for human exploration beyond low-Earth orbit (LEO)

- **The Law authorizes**
  - Extension of the International Space Station (ISS) until at least 2020
  - Strong support for a commercial space transportation industry
  - Development of a Multi-Purpose Crew Vehicle (MPCV) and heavy lift launch capabilities
  - A “flexible path” approach to space exploration, opening up vast opportunities including near-Earth asteroids and Mars
  - New space technology investments to increase the capabilities beyond Earth orbit (BEO)

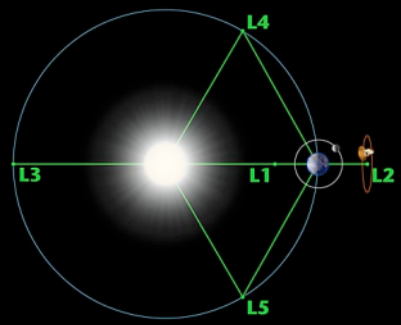
This rocket is key to implementing the plan laid out by President Obama and Congress in the bipartisan 2010 NASA Authorization Act.
— NASA Administrator Charles Bolden
September 14, 2011

The SLS Acquisition Strategy Reflects Executive and Legislative Branch Direction and Law

SLS Is a National Asset for Multiple Stakeholders and Partners



SLS Is a National Capability for Exploration Missions



High-Earth Orbit (HEO)/Geosynchronous-Earth Orbit (GEO)/Lagrange Points:
- Microgravity destinations beyond LEO
- Opportunities for construction, fueling, and repair of complex in-space systems
- Excellent locations for advanced space telescopes and Earth observatories

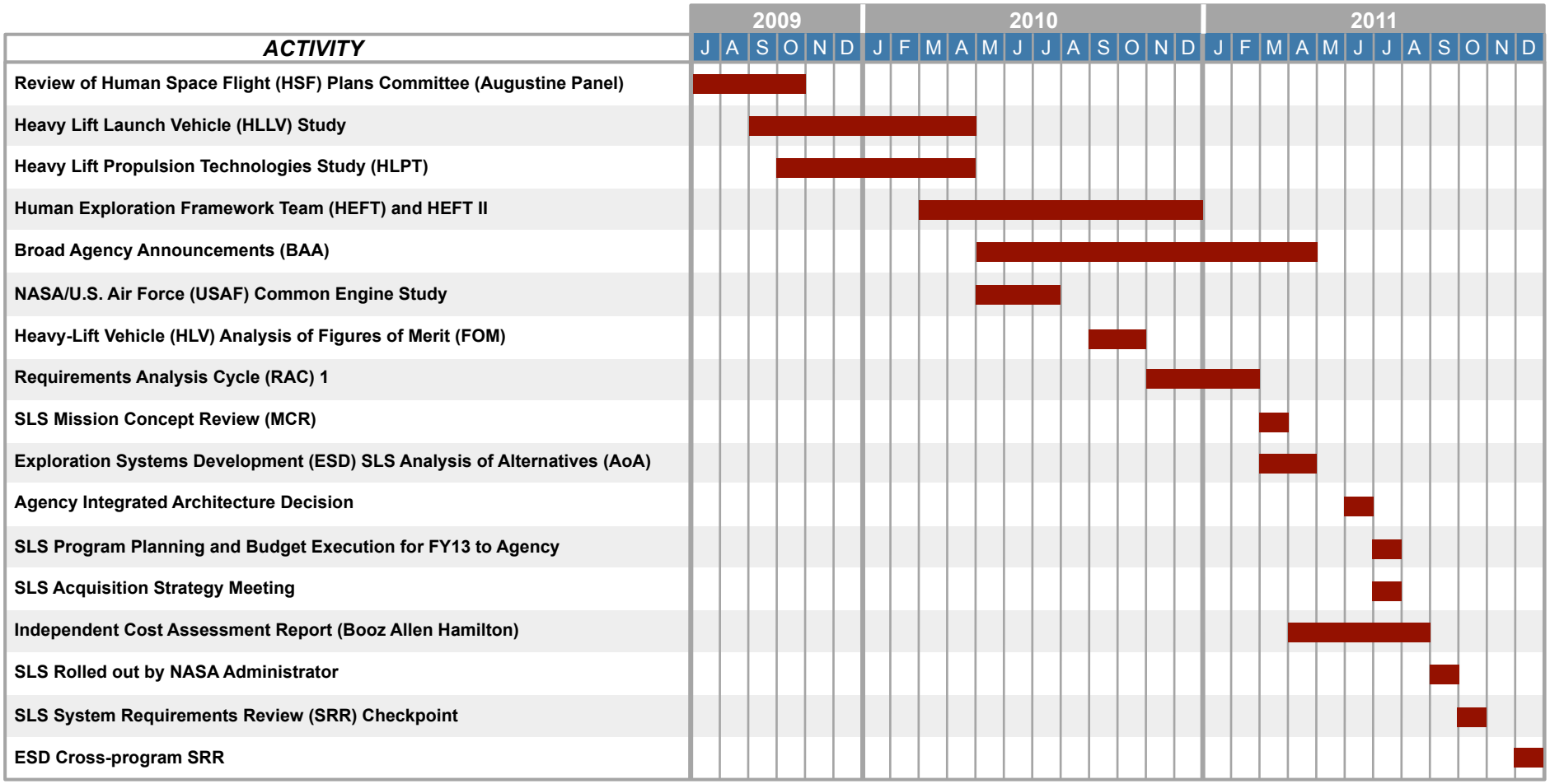
Mars and Its Moons Phobos and Deimos:
- A premier destination for discovery: Is there life beyond Earth? How did Mars evolve?
- True possibility for extended, even permanent, stays
- Significant opportunities for international collaboration
- Technological driver for space systems

Earth's Moon:
- Witness to the birth of the Earth and inner planets
- Has critical resources to sustain humans
- Significant opportunities for commercial and international collaboration

Near-Earth Asteroids:
- Compelling science questions: How did the Solar System form? Where did Earth's water and organics come from?
- Planetary defense: Understanding and mitigating the threat of impact
- Potential for valuable space resources
- Excellent stepping stone for Mars

SLS Is Evolvable and Flexible

SLS Roadmap: Extensive Engineering and Business Analyses and Planning



"Take your time and get it right."

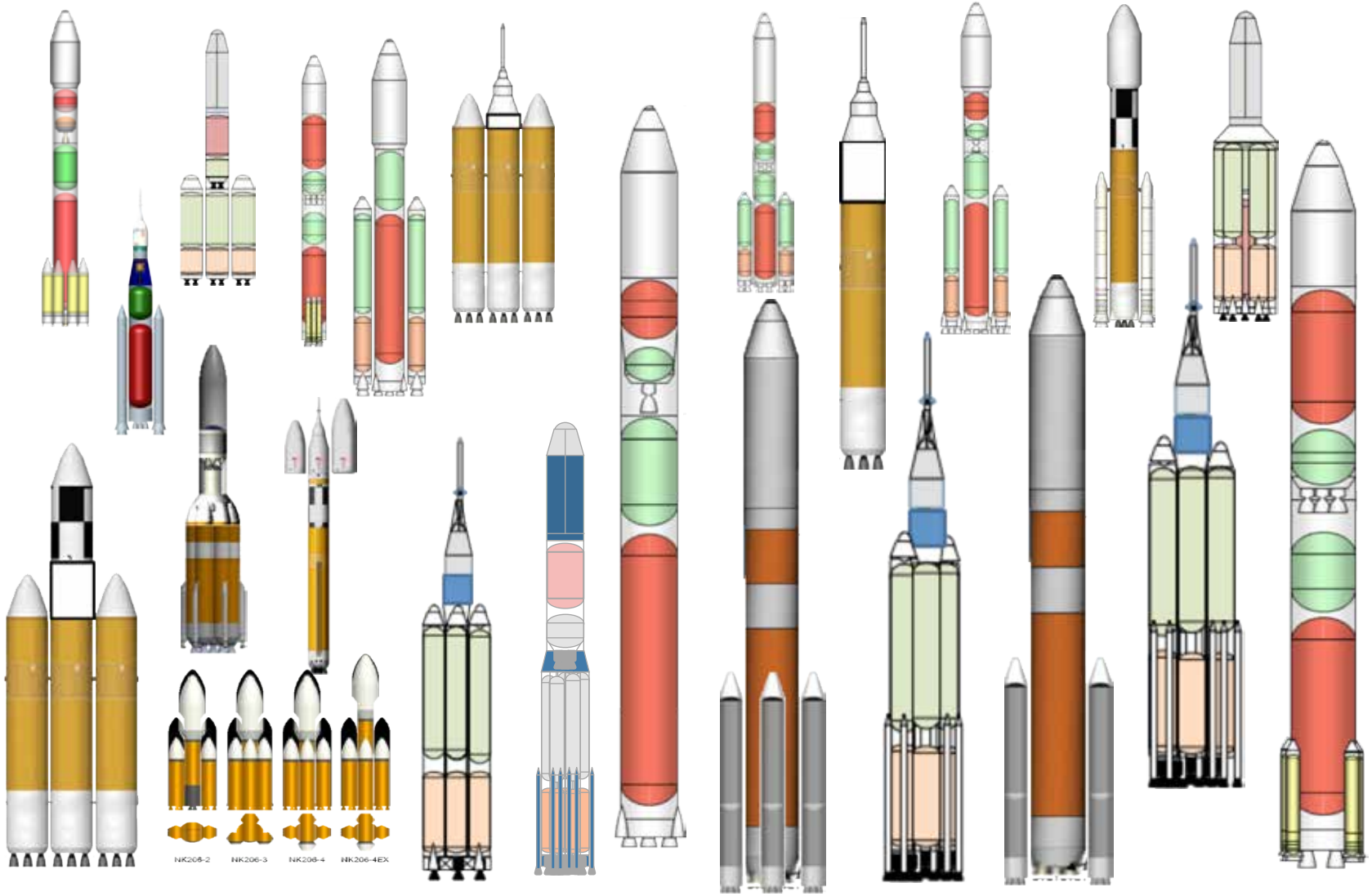
—Tom Gavin, Jet Propulsion Laboratory

SLS Mission Concept Review, March 2011

SLS Driving Objectives

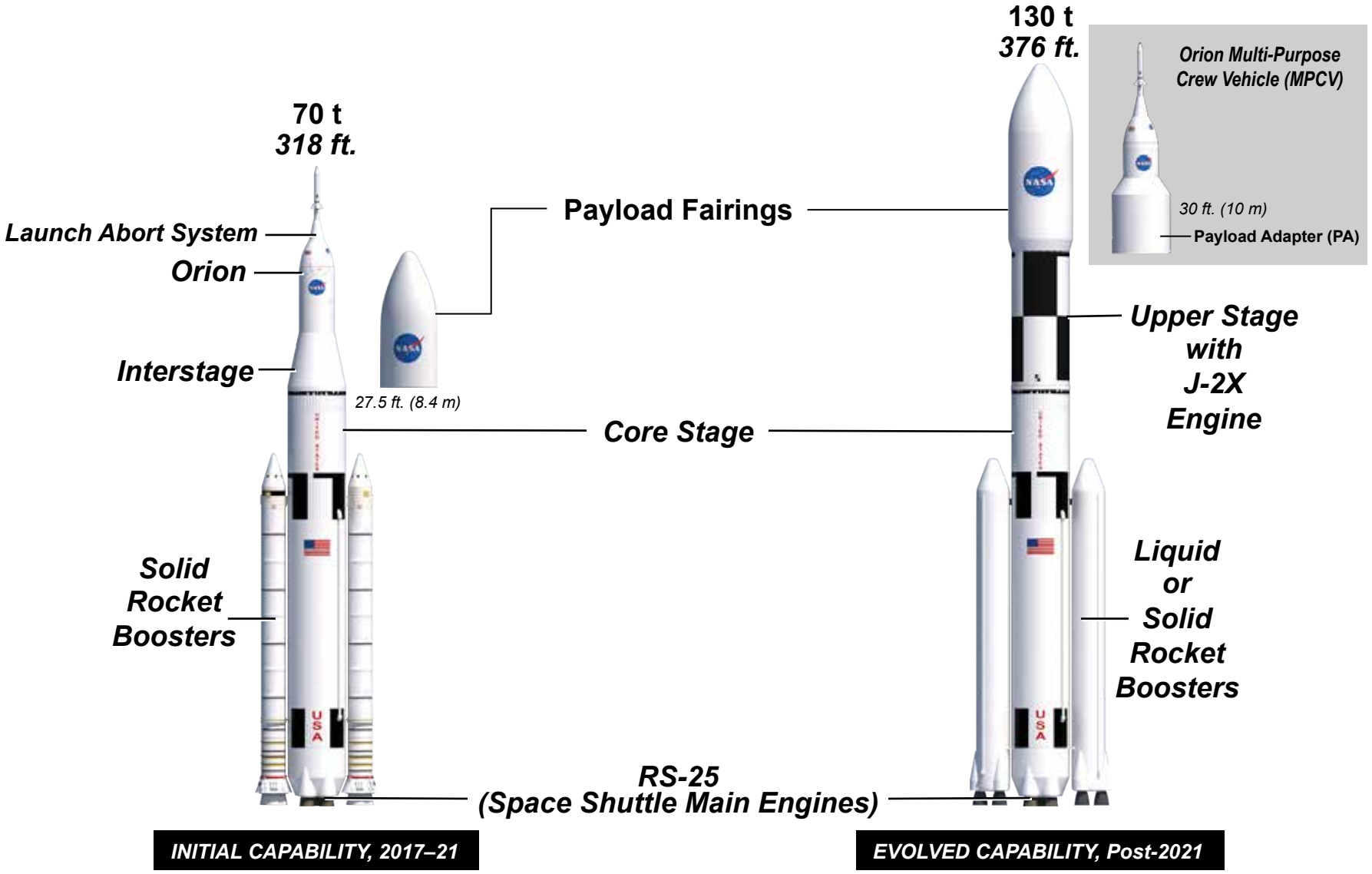
- **National Heavy-Lift Capacity**
  - 70 tonnes (t) evolvable to 130 t
  - Serves as primary transportation for MPCV and exploration missions
  - Provides back-up capability for crew/cargo to ISS
  - Offers volume for science missions and payloads of national importance
- **Safe: Human-Rated**
  - Loss of Crew/Loss of Mission: TBR
- **Affordable**
  - Constrained budget environment, with no planned escalation
  - Maximum use of common elements and existing assets, infrastructure, and workforce
- **Near-Term Capability**
  - First flight in 2017

Many Solutions Considered

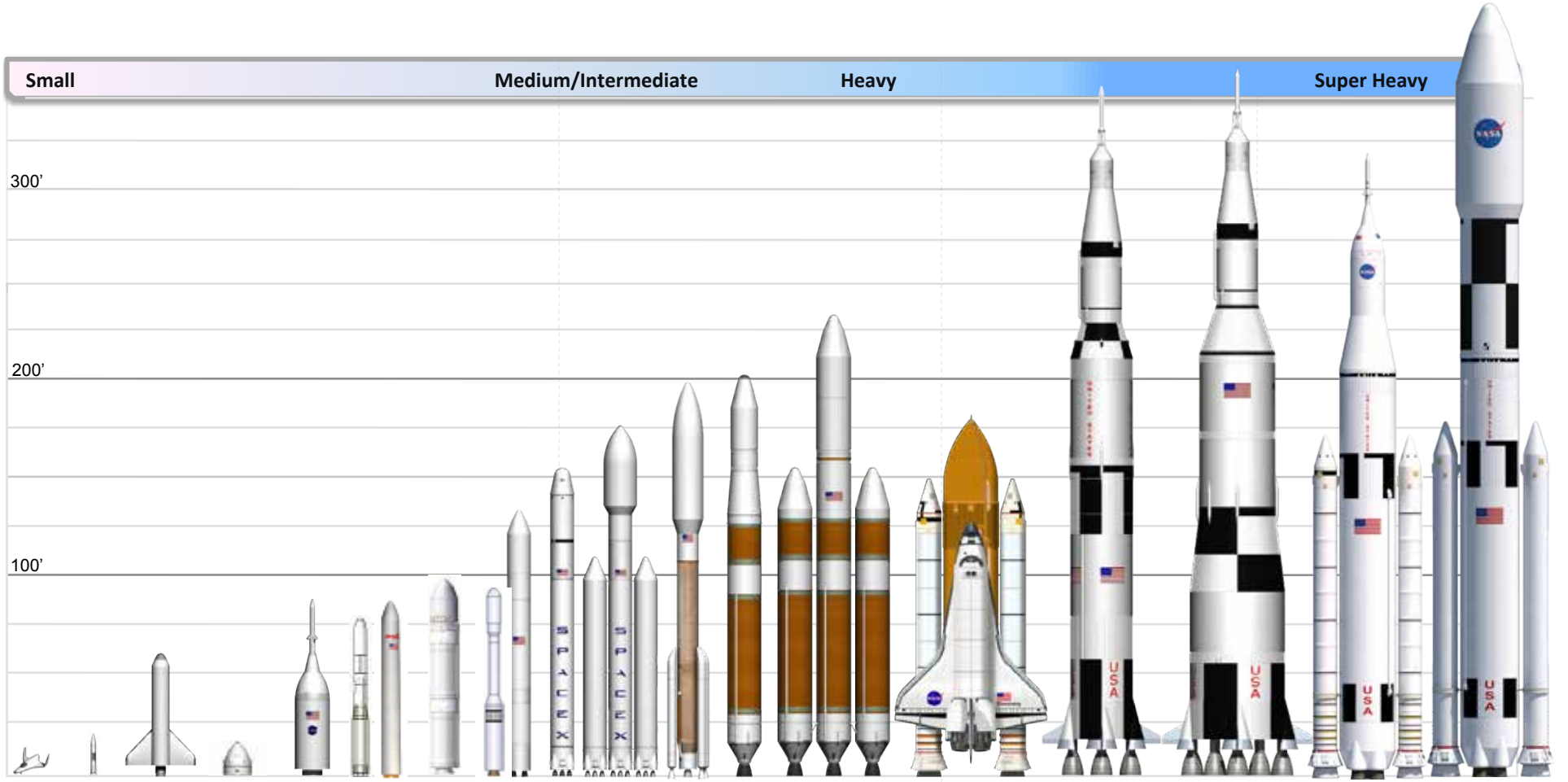


“This enterprise is not for the faint of heart.”
—Wayne Hale

SLS Architecture Uses Existing and Advanced Technologies to Fly in 2017



SLS Will Be the Most Capable U.S. Launch Vehicle



Sample of Proposed and Fielded U.S. Systems

SLS Point of Departure (POD) Initial Concept

- **Core Stage**
  - 27.5-foot (8.4-meter) diameter
  - Liquid oxygen/liquid hydrogen (LOX/LH_2) fuel (30 years of U.S. aerospace experience)
  - RS-25 engines (starts with Space Shuttle Main Engine inventory assets)
- **Commonality of Design and Manufacturing between Core Stage and Upper Stage**
  - Same diameter
  - Single facility and contractor
  - Modern manufacturing tooling and techniques
- **Boosters**
  - Initial flights are 5-segment solid rocket boosters (Ares derived)
  - Future flights will use competitively procured boosters, which may be solid or liquid
- **J-2X Upper Stage Engine**
  - Restart capability supports future in-space transfer stages trade studies
  - Metered development effort to support 130 t exploration missions

Vehicle Development and Acquisition Phased to Fit Budget Constraints and Schedule Targets

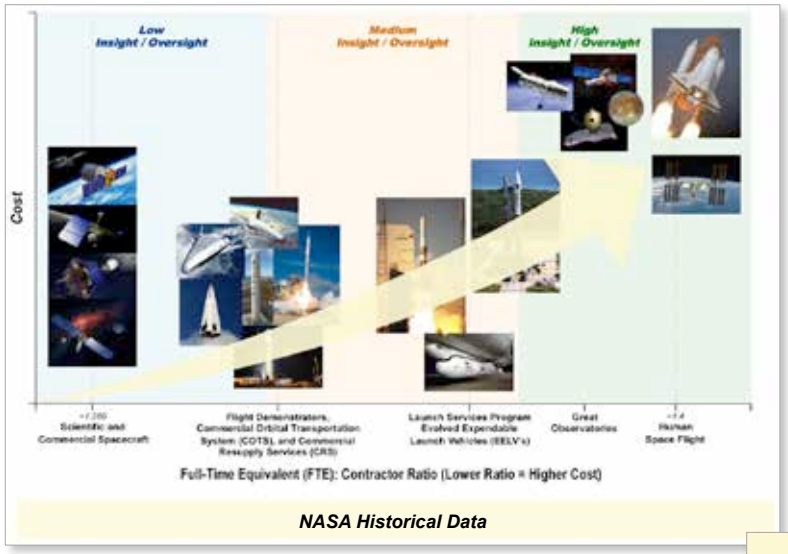
SLS Vehicle Configuration Decision Rationale

- **Maintains U.S. leadership in LOX/LH_2 technology**
  - LOX/LH_2 Core Stage uses RS-25 engines; LOX/LH_2 Upper Stage uses J-2X engine
  - Establishes fixed central design path, with logical use of existing strength in design and modern manufacturing approaches
  - Harnesses existing knowledge base, skills, infrastructure, workforce, and industrial base for existing state-of-the-art systems

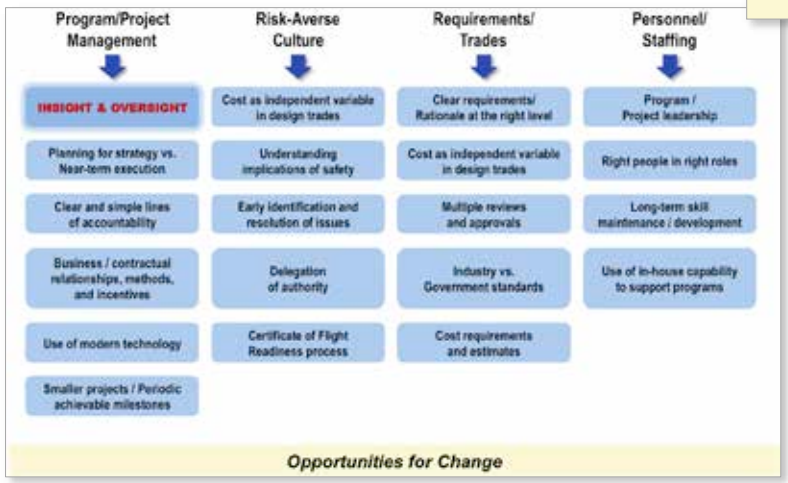
- **Minimizes unique configurations during vehicle development**
  - Evolutionary path to 130 t allows incremental development; thus, progress will be made, even within constrained budgets
  - Allows early flight certification for MPCV
  - May be configured for MPCV or science payloads, providing flexible/modular design and system for varying launch needs
  - Gains synergy, thus reducing design, development, test, and evaluation (DDT&E) costs and schedule by building the Core Stage and Upper Stage in parallel, thereby leveraging common tooling and engine-feed components

Technical Trade Studies and Business Planning Validated Independently

SLS Affordability Tenets



NASA Historical Data



Opportunities for Change

- **Evolvable Development Approach**
  - Manage Within Constrained / Flat Budgets
  - Leverage Existing National Capabilities
  - Infuse New Design Solutions for Affordability
- **Robust Designs and Margins**
  - Performance Traded for Cost and Schedule
- **Risk-Informed Government Insight/Oversight Model**
  - Insight Based On:
    - Historic Failures
    - Industry Partner Past Performance/Gaps
    - Complexity and Design Challenges
  - Judicious Oversight:
    - Discrete Oversight vs. Near Continuous
    - Decisions Made Timely and Effectively
- **Right Sized Documentation and Standards**
  - Reduction in the Number of Program Documents
  - Industry Practices and Tailored NASA Standards
- **Lean, Integrated Teams with Accelerated Decision Making**
  - Simple, Clear Technical Interfaces with Contractor
  - Systems Engineering & Integration (SE&I) Organization
  - Empowered Decision Makers at All Levels

SLS Acquisition Strategy Fully Supports Affordability, Which Is Required for Sustainability

Potential to Build on Heritage Hardware and Facilities

J-2X Test Firing/Space Shuttle Main Engine Testing
Stennis Space Center

Payloads
Goddard Space Flight Center

MPCV Integration
Johnson Space Center

Composite Structures
Glenn Research Center

Ground and Launch Operations
Kennedy Space Center

Physics Based Analysis
Ames Research Center

Manufacturing and Transportation
Michoud Assembly Facility

Wind Tunnel Testing
Langley Research Center

Standing Review Team
Jet Propulsion Laboratory

J-2X Upper Stage Engine Injector Firing
Marshall Space Flight Center

Smartly Selecting the Most Efficient Infrastructure

SLS Top-Level Schedule

ELEMENT	FY11	FY12	FY13	FY14	FY15	FY16	FY17
SLS Major Milestones	MCR	SRR Checkpoint SRR/ SDR	PDR		CDR	DCR	First Flight Hardware Delivery

LEGEND:

CDR	*Critical Design Review*
DCR	*Design Certification Review*
MCR	*Mission Concept Review*
PDR	*Preliminary Design Review*
SDR	*System Definition Review*
SRR	*System Requirements Review*

First Flight 2017

PRELIMINARY

SLS Program Organization at MSFC

Manager
Todd May

Deputy
Jody Singer

Hard line programmatic
Matrix relationship

Chief Engineer (CE)
Garry Lyles

Deputy CE
Danny Davis

Program Planning &
Control (PP&C) Manager
Jerry Cook

Chief Safety Officer
Rick Burt

Deputy CSO
Dan Mullane

Procurement
Earl Pendley

Ground Operations Liaison
Manager
Brian Matisak

Advanced
Development Manager
Fred Bickley

Spacecraft & Payload
Integration Manager
David Beaman

Boosters Element Manager
Alex Priskos

Engines Element Manager
Mike Kynard

Stages Element Manager
Tony Lavoie

Avionics Element Manager
Lewis Wooten

Advancing the U.S. Legacy of Human Exploration

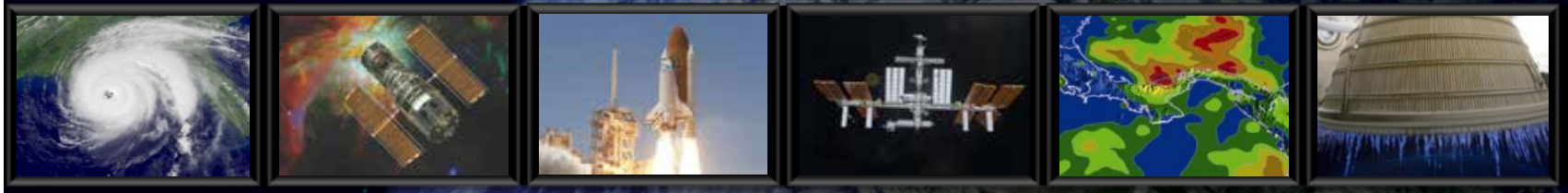
Summary

- SLS is a national capability that empowers entirely new exploration missions.
- Program key tenets are *safety, affordability, and sustainability.*
- SLS builds on a solid foundation of experience and current capabilities to enable a fast start and a flexible heavy-lift capacity for missions of national importance.
- The SLS acquisition will help U.S. aerospace industry stay strong as it develops initial capabilities, as well as provide competitive opportunities for advanced technologies for evolvable capabilities.
- The SLS Team has made significant progress and looks forward to working with you to continue America's leadership in space.

National Aeronautics and Space Administration

Space Launch System (SLS) Program Acquisition Overview

MAF Industry Day



Space Launch System

Earl Pendley, Manager
Space Transportation Support Procurement Office
NASA Marshall Space Flight Center

Path to the SLS Acquisition Plan

- The NASA Authorization Act of 2010 (PL 111-267, Oct. 11, 2010) requires that NASA deliver a Space Launch System with at least 70 t of initial capability and 130 t of evolved capability.
- The President's FY12 Budget Request includes funding for SLS.
- The FY11 Appropriation Act includes funding for SLS.
- NASA selected an architecture in June 2011 to meet the Authorization Act.
- NASA conducted an Agency-level SLS Acquisition Strategy meeting in July 2011.
- NASA conducted Procurement Strategy Meetings in mid-September 2011.
- Acquisition Process is proceeding

This rocket is key to implementing the plan laid out by President Obama and Congress in the bipartisan 2010 NASA Authorization Act.
— NASA Administrator Charles Bolden
September 14, 2011

SLS Acquisition Strategy Fulfills Legislative and Executive Branch Direction and Law

Key SLS Requirements

- **Affordability**
  - Flat annual budget profile
  - Existing contracts and assets used for initial capability
    - Significant hardware investments maximized
    - Significant portions of the supply chain in place
    - Work can begin earlier, engaging the U.S. aerospace workforce
    - Less design, development, test, and evaluation (DDT&E) risk and costs
    - Contract types to move to more objective incentive structures
- **Performance Margin**
  - Initial near-term capability of 70 t, evolvable to 130 t
  - Modular flexible architecture that may be configured for mission needs
  - Significant National capability
- **Evolvable**
  - Competitions for technology infusions and vehicle upgrades for future capability

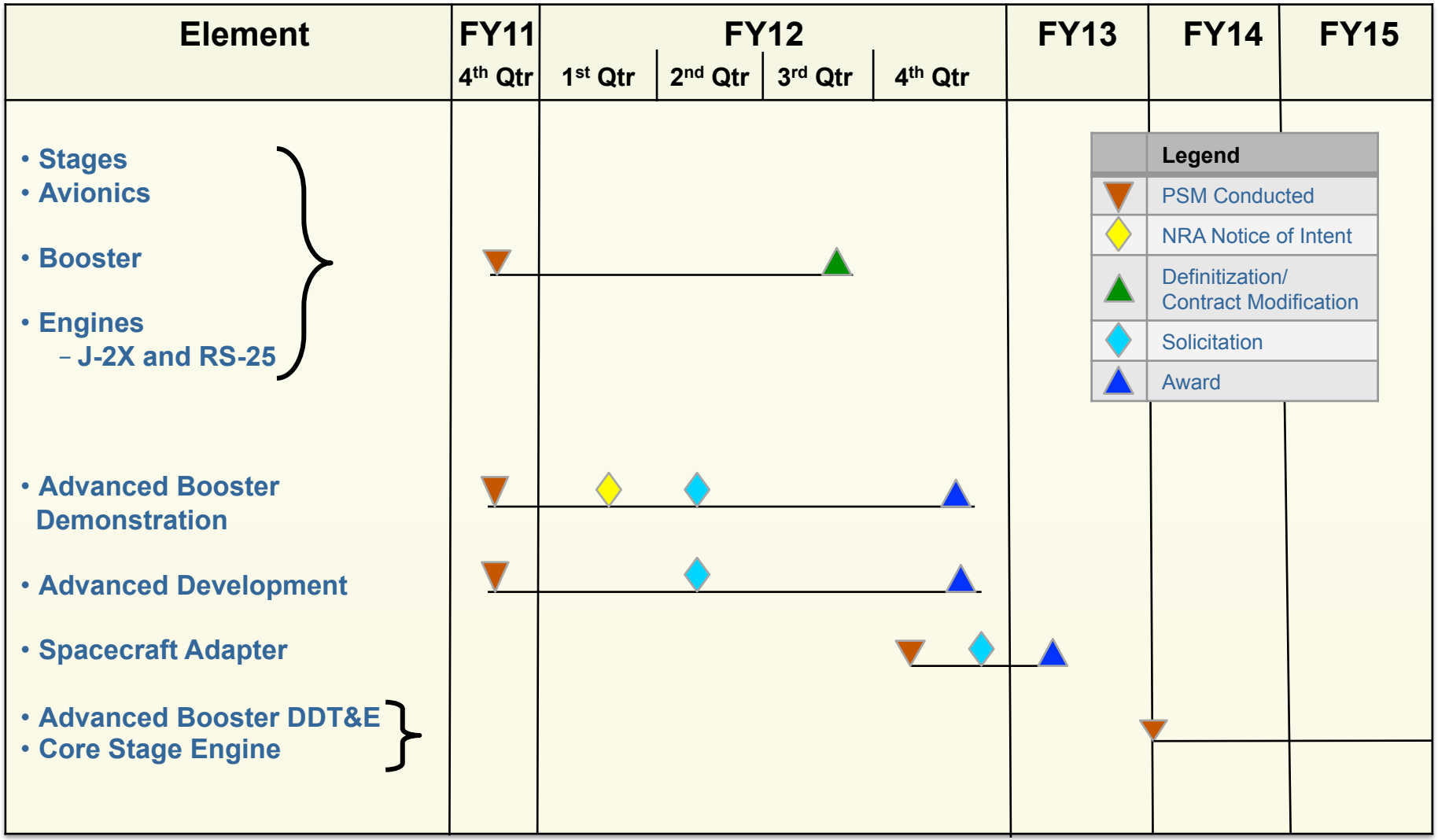
SLS Will Be Safe, Affordable, and Sustainable

SLS Procurements

- **Boosters**
  - 5-segment Solid Rocket Booster in-scope modification to existing Ares contract with ATK for initial flights through 2021
  - Advanced Boosters
    - Engineering demonstration and risk reduction via NRA: Full and Open Competition later this year
    - DDT&E: Full and Open Competition
- **Stages**
  - Core/Upper Stage: Justification for Other Than Full and Open Competition (JOFOC) to Boeing, modifying current Ares Upper Stage contract
  - Avionics
    - Instrument Unit Avionics: In-scope modification to existing Ares contract with Boeing; to be consolidated with Stages contract to Boeing
- **Engines**
  - Core Stage Engine: RS-25 JOFOC to existing Space Shuttle contract with Pratt & Whitney Rocketdyne (PWR)
  - Upper Stage Engine: J-2X in-scope modification to existing Ares contract with PWR
- **Spacecraft and Payload adapter and Fairing**
  - Full and Open Competition to begin in FY13
- **Advanced Development**
  - Broad Agency Announcement (BAA)/NASA Research Announcement (NRA): Full and Open Competition
  - Future Core Stage Engine: Separate contract activity to be held in the future

Delivers Near-Term Initial Capabilities and Spurs Competition for Evolved Capabilities

Procurement Schedule



On Track for First Flight in 2017

PRELIMINARY

SLS Small Business Goals

- **The NASA MSFC Small Business Specialist is performing a NASA Policy Directive 5000.2C uniform methodology assessment for the appropriate SLS requirements:**
  - Stages
  - Engines
  - Advanced Booster
- **Subcontracting plan goals for existing contracts will be updated via negotiations.**
- **For incentive fee contracts, an incentive fee applicable to a small business utilization performance-type of measurement will be explored.**
  - Mentor/Protégé Program will be included
- **SLS will provide topics to the Small Business Innovation Research (SBIR) Program.**
  - Link to the NASA SBIR website will be listed on all solicitations
    - http://sbir.gsfc.nasa.gov/SBIR/SBIR.html

Targeting Robust Small Business Partnerships Through Various Channels

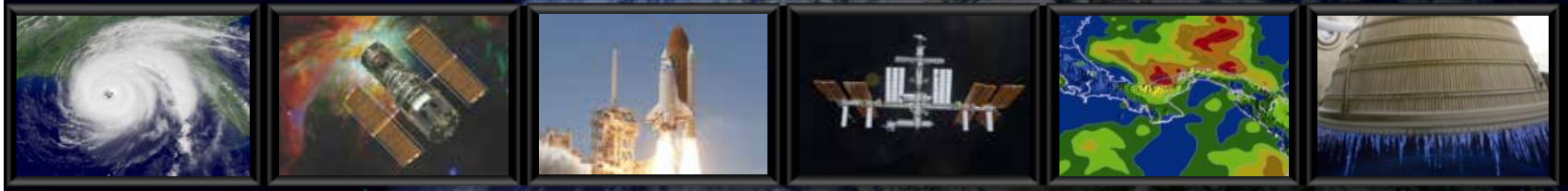
SLS Acquisition Summary

- **The SLS acquisition strategy is consistent with Legislative and Executive branch direction.**
- **The acquisition strategy meets key SLS requirements of *safety, affordability, and evolvable performance.***
- **SLS will continue to work closely with NASA's Office of Small Business Programs to maximize opportunities for all parts of the Agency's socio-economic programs.**
- **Competitive actions will have specific and detailed Industry Days in the future.**
- **Contact information: Earl Pendley**
  - Phone: 256-544-2949
  - email: george.e.pendley@nasa.gov

National Aeronautics and Space Administration

Michoud Assembly Facility (MAF) Update
MAF Industry Day

Space Launch System



John Honeycutt, Deputy Manager
Stages Element
NASA Space Launch System Program

Stages Element Overview

- **Acquisition approach directly supports human space exploration.**
  - Consolidates Stages and Instrument Unit Avionics contracts.
- **Common Core Stage and Upper Stage supports affordability and sustainability.**
  - Maximizes existing workforce, infrastructure, and contracts.
  - Leverages efficiencies in design, development, tooling, and processes.
  - Drives production toward common element responsibility and contractor.
- **The Stages Element will integrate Core Stage and Upper Stage Engines to deliver a complete stage ready for launch processing at the Kennedy Space Center.**

Core Stage Is on the Program's Critical Path to First Flight in 2017

Stages Element Requirements

- **Core Stage**
  - Accommodates three to five RS-25 engines.
  - Accommodates LOX/ LH_2 cryogenic tanks to provide propellant to three to five Core Stage Engines (RS-25).
  - Delivers a 70-t initial lift capability, with three Core Stage Engines .
- **Upper Stage**
  - Accommodates LOX/LH_2 cryogenic tanks to provide propellant to J-2X engines.
  - Accommodates one to three J-2X Upper Stage Engines.
  - Delivers a 130 t evolved lift capability, with three Core Stage Engines (RS-25).
- **Avionics Suite**
  - Provides all system-level command and control functions for the launch vehicle.
  - Provides all data distribution and communications.
  - Provides power to the Core Stage and Upper Stage.
- **Mission support for applicable phases**
  - Stages sustaining engineering support.
  - Stages launch support.
  - Stages launch processing support at the launch site.
- **Stages manufacturing and integration at MAF**

Acquisition Strategy Is a Single Prime Contractor to Design, Develop, Manufacture, and Deliver SLS Stages

Core Stage

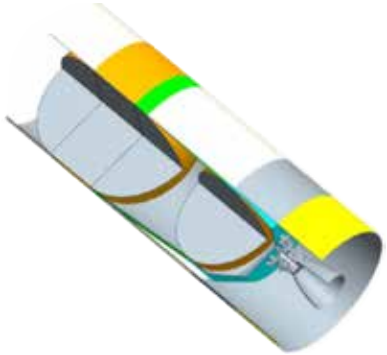
- **Flexible design configured for the mission**
  - Will be designed once for all mission types.
  - 27.5-ft-diameter (8.4m) tank will provide propellant for three to five RS-25 engines, depending on mission needs.
- **Key interfaces for:**
  - Boosters
  - Payload
  - Upper Stage
- **Includes the Main Propulsion System (MPS)**

Core Stage

Backbone of the Space Launch System

Upper Stage

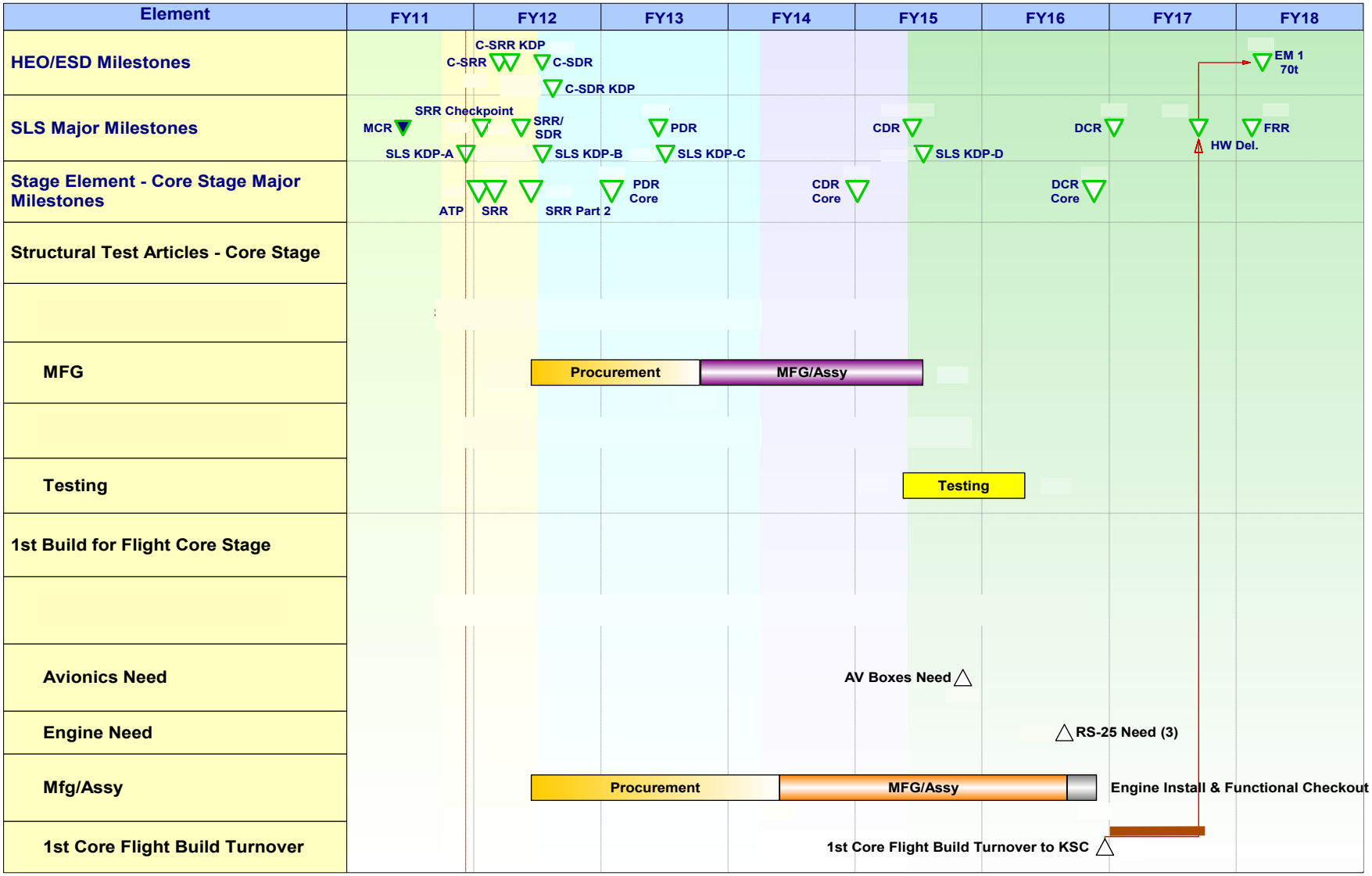
- **Required for missions with heavy-lift requirements**
  - Has the same diameter as the Core Stage, 27.5 ft (8.4m).
  - Houses one to three J-2X Upper Stage Engines, depending upon mission needs.
  - Is activated after the Boosters and Core Stage have been depleted and expended during flight.



Upper Stage

Evolved Capability for Heavier Lift Payload Requirements

Stages Element Schedule



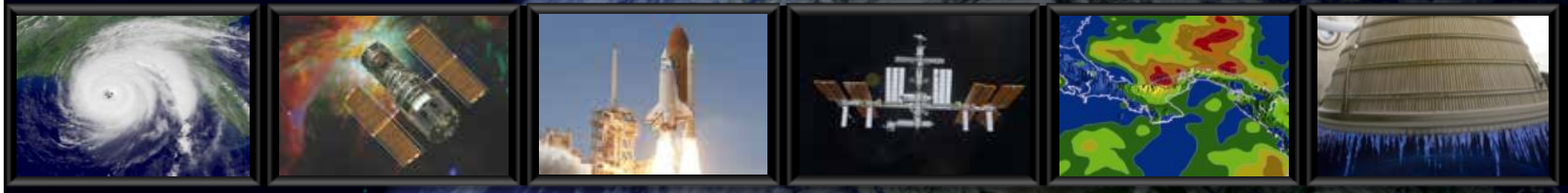
SLS First Flight 2017

PRELIMINARY

National Aeronautics and Space Administration

Michoud Assembly Facility (MAF)
SLS Industry Day

Space Launch System



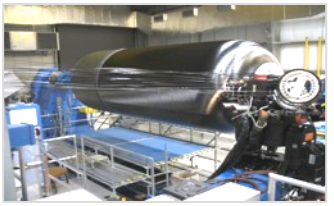
Robert Champion, Chief Operating Officer
Michoud Assembly Facility

November 2011

Marshall Space Flight Center's Michoud Assembly Facility

Background

- Unique manufacturing capabilities perfectly suited for SLS manufacturing requirements
  - Delivered large-scale structures for NASA's Apollo and Shuttle Programs
  - Manufacturing primary structure for the Orion Multi-Purpose Crew Vehicle (MPCV)
- Site comprises 832 acres, with over 2M square feet of manufacturing space (43 acres under one roof) and 900k square feet of office space
- Conveniently located and accessible:
  - Deep-water port, Gulf of Mexico waterway, multiple ports on Mississippi River
  - Less than 5 miles from intermodal rail stations and Class-One rails
  - Less than 1 mile from interstate highway
  - Convenient lakefront airport that accommodates dual-wheel cargo craft



Significant State of Louisiana investment in manufacturing capability

MAF Transformation

- Over the last 24 months, updated from single- to multi-project facility to support NASA Projects/Programs and new commercial tenants
- Reduced operating costs to NASA with:
  - Implementation of shared services and broader tenant base
  - Commercial and non-NASA Government access to available excess capacity

One-of-a-Kind Infrastructure Asset

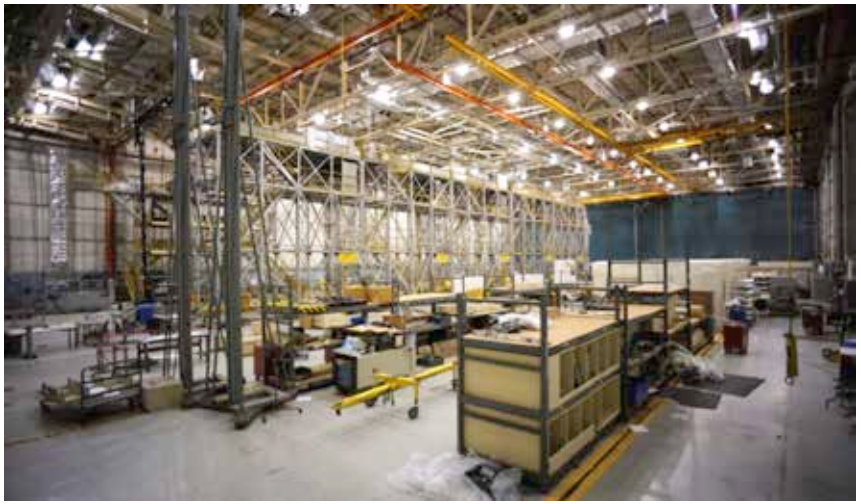
Innovative New Business Model

- **Multiple NASA Programs**
  - Space Shuttle External Tank (retired)
  - Ares Upper Stage(transitioned)
  - Orion MPCV
  - Space Launch System (SLS)
- **Turn-Key Manufacturing**
  - Infrastructure
  - Laboratories
  - Equipment
  - Support
- **Commercial & Government Tenants**
  - Lockheed Martin
  - Blade Dynamics
  - B-K Manufacturing
  - Long Branch Production Company
  - British Petroleum
  - DNV
  - USDA
  - U.S. Coast Guard

mafspace.msfc.nasa.gov

MAF Is Ready to Support America's New Heavy-Lift Launch Vehicle

- **MAF team is working with the SLS Stages Element**
  - Manufacturing Core Stage and Upper Stage
  - Manufacturing Instrument Ring
  - Integrating Engines with Core and Upper Stages
- **MAF Team has transformed MAF into Multi-Tenant Facility**
  - Enhancing services
  - Pursuing affordability
  - Meeting customers needs



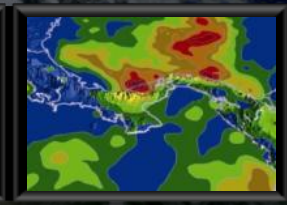
National Aeronautics and Space Administration

MAF Site Development
SLS Industry Day

Space Launch System



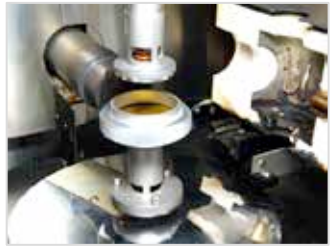





Jim Taylor, MAF Site Development Coordinator
Michoud Assembly Facility
November 2011

Offering Advanced Manufacturing Facilities

- **SLS is an anchor tenant, with excess capacity available:**
  - Commercialization strategy of leasing available capacity
  - Manufacturing and assembly, warehouse, and green space are available
- **Suppliers and subcontractors to SLS elements located at MAF can collocate with their customer to:**
  - Utilize the same world-class infrastructure, equipment, and services
  - Significantly reduce logistics cost and delivery time by sharing common space
  - Benefit from State of Louisiana economic development incentives
- **A highly-skilled workforce is available to serve you, including:**
  - More 3,400 academic, technology- and industry-based candidates
  - Sought-after talents and competencies, e.g., researchers, engineers, technicians, mechanics, and skilled machinists



A Strong, Well-Positioned Business Partner

- **MAF has fully transformed into a multi-tenant facility:**
  - NASA Programs (SLS, Orion)
  - Other Federal Agencies (USDA, USCG)
  - Commercial (Boeing, Lockheed-Martin, Blade Dynamics, B-K Manufacturing, etc.)

- **NASA will continue to increase occupancy of existing facilities:**
  - Expanding current tenants' existing footprints
  - Aggressively pursuing new tenants and strategic partners
  - Reducing site carrying cost makes MAF more affordable for NASA and tenants

- **MAF offers excellent location and regional quality of life:**
  - Affordable cost of living
  - Ample educational opportunities
  - Extensive healthcare system
  - Abundant recreational, sports, and local attractions

mafspace.msfc.nasa.gov

For more information

Jim Taylor

Site Development Coordinator

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256-714-5066 Mobile

504-257-2624 MAF Office

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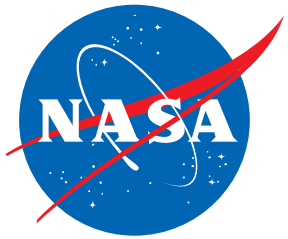
For More Information



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